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Trombetta et al.

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(54) **BEVERAGE CAPSULE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 725 days.

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(22) Filed: **Aug. 31, 2012**

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
B65D 85/804 (2006.01)
B65B 29/02 (2006.01)

(52) **U.S. Cl.**
CPC ***B65D 85/8043*** (2013.01); *B65B 29/02* (2013.01)

(58) **Field of Classification Search**
CPC B65D 85/8043; B65D 85/804; B65B 29/02; B65B 29/06
USPC 99/295; 426/77–79
See application file for complete search history.

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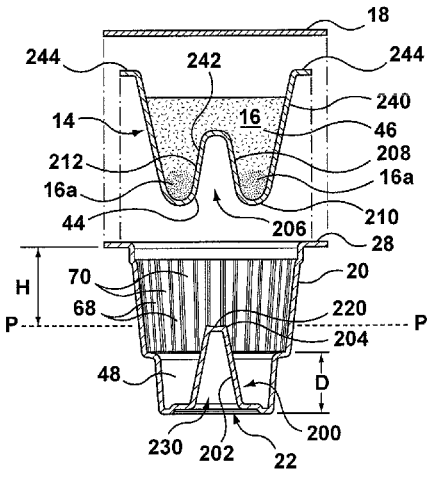
(57) **ABSTRACT**

A beverage capsule has a body, a filter disposed in the body, ingredients disposed in the filter and a cover. The body includes a side wall that extends from an end wall to an opening that is covered by the cover. A boss extends into the interior space from the end wall inwardly of an extraction region. In one embodiment, the boss defines an engagement surface having a plurality of arms for engaging a bottom portion of the filter during use. In another embodiment, the boss engages the filter to define a tented filter zone wherein an inner portion of the filter is spaced a further distance from the end wall than an outer portion of the filter. In another embodiment, a diffusing surface is disposed in the body downstream of where a fluid is intended to enter the opening of the capsule during use with a beverage preparing machine.

15 Claims, 7 Drawing Sheets



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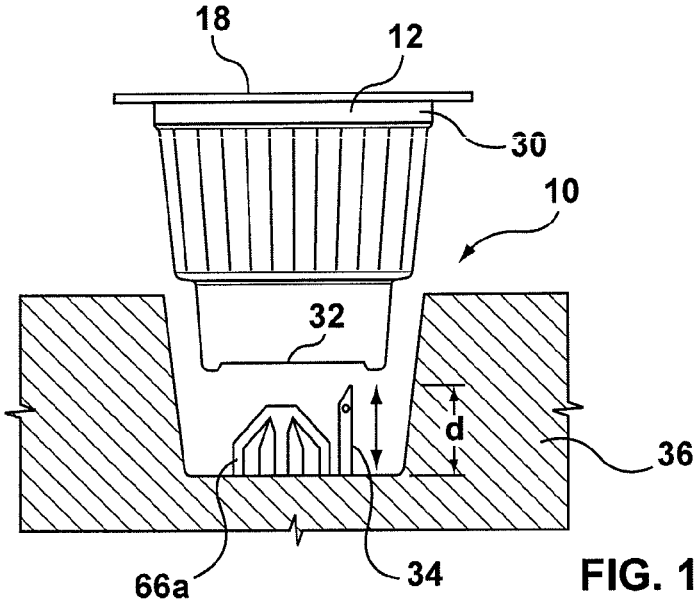

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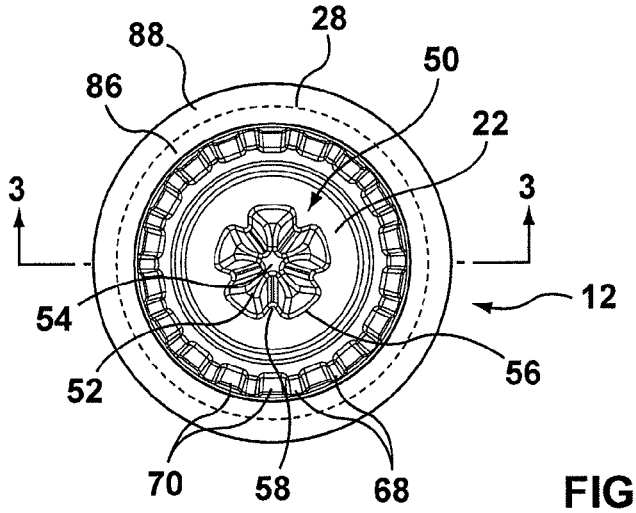

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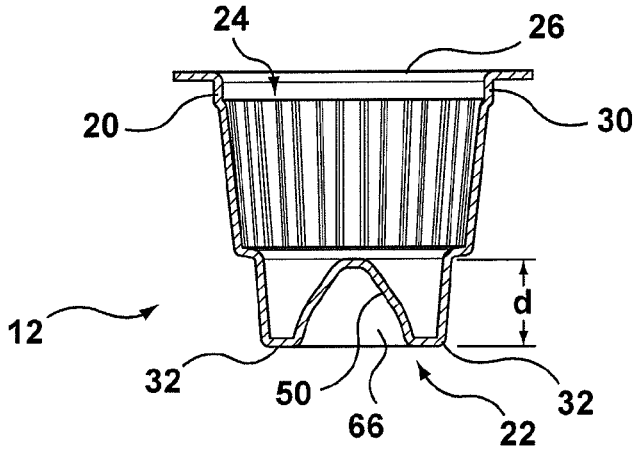

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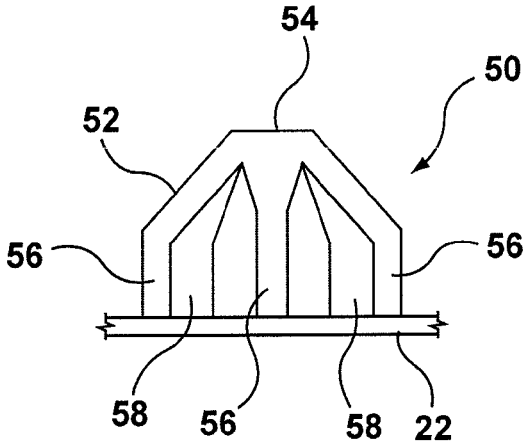

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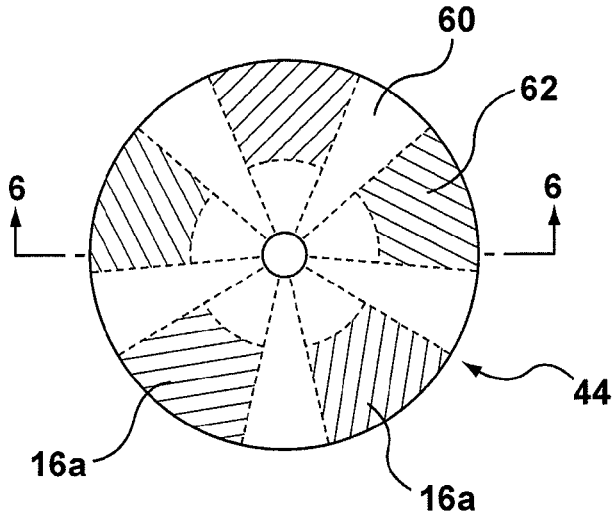

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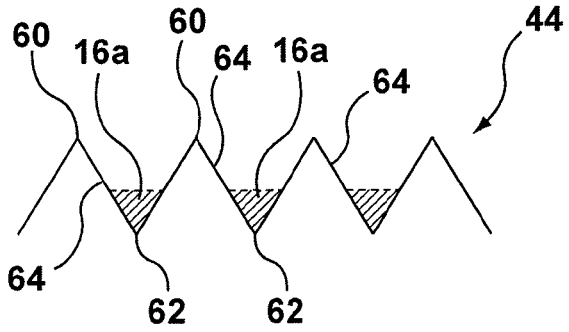

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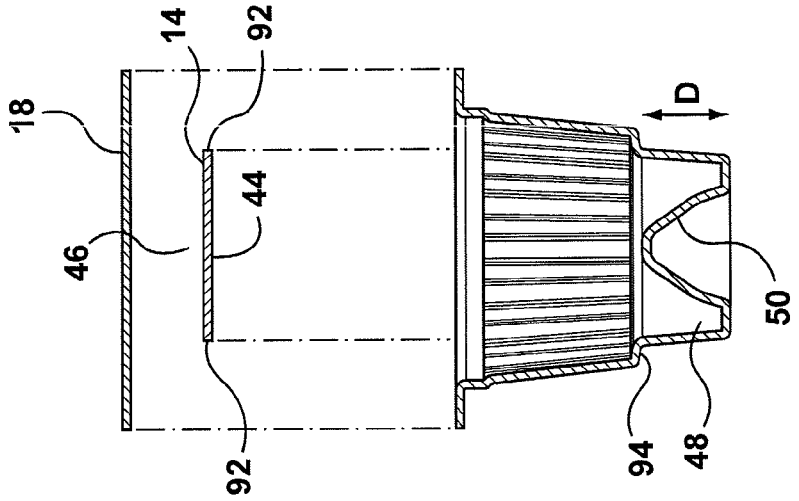

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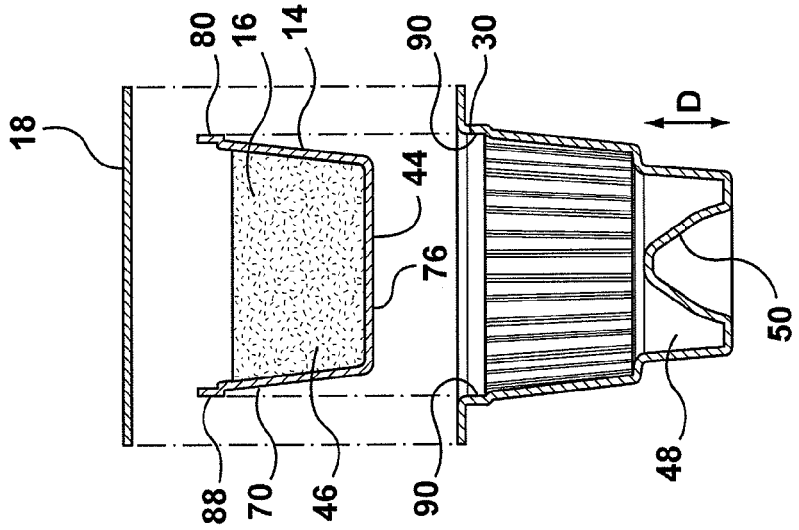

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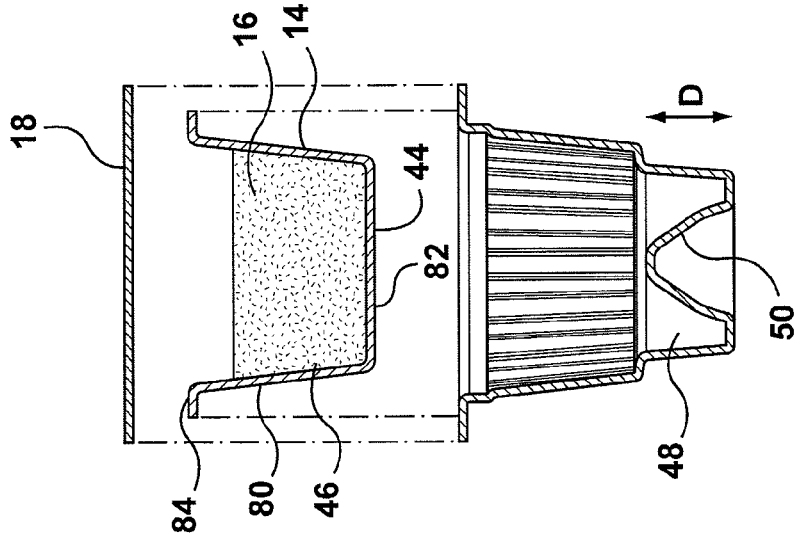

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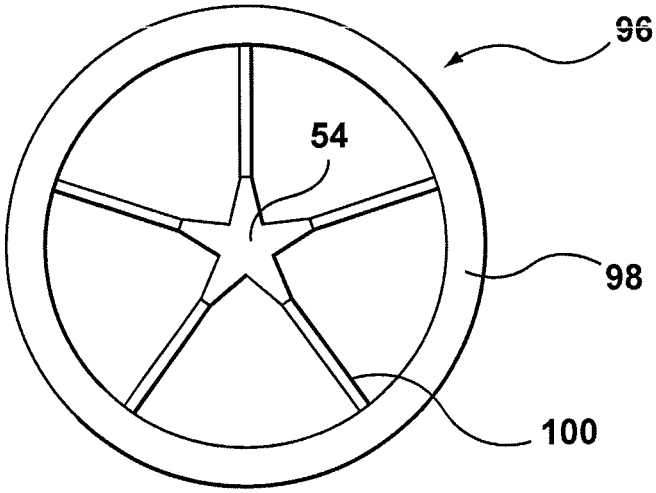

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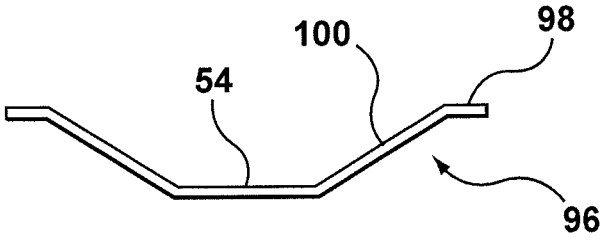

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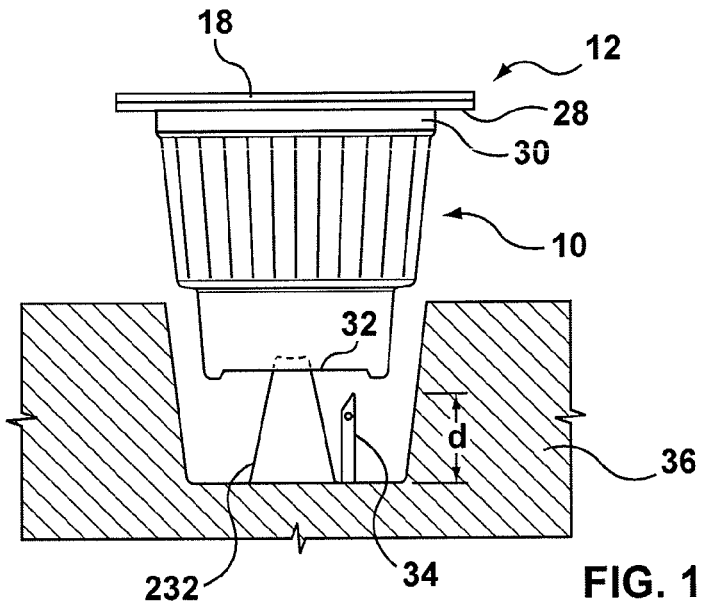

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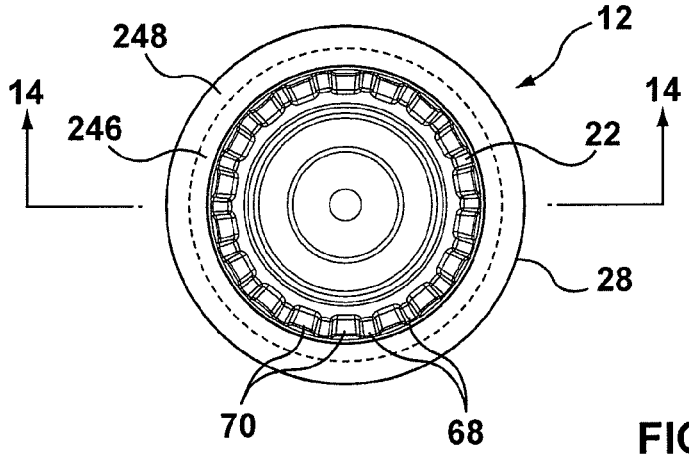

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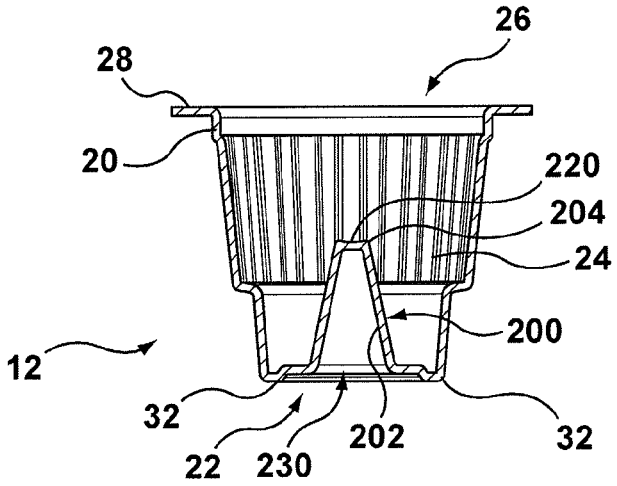

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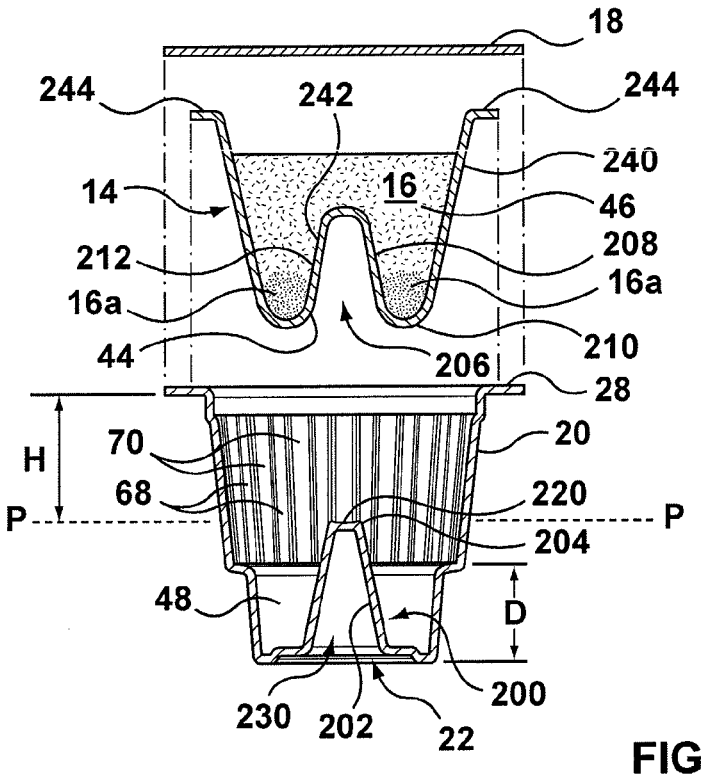
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FIG. 15

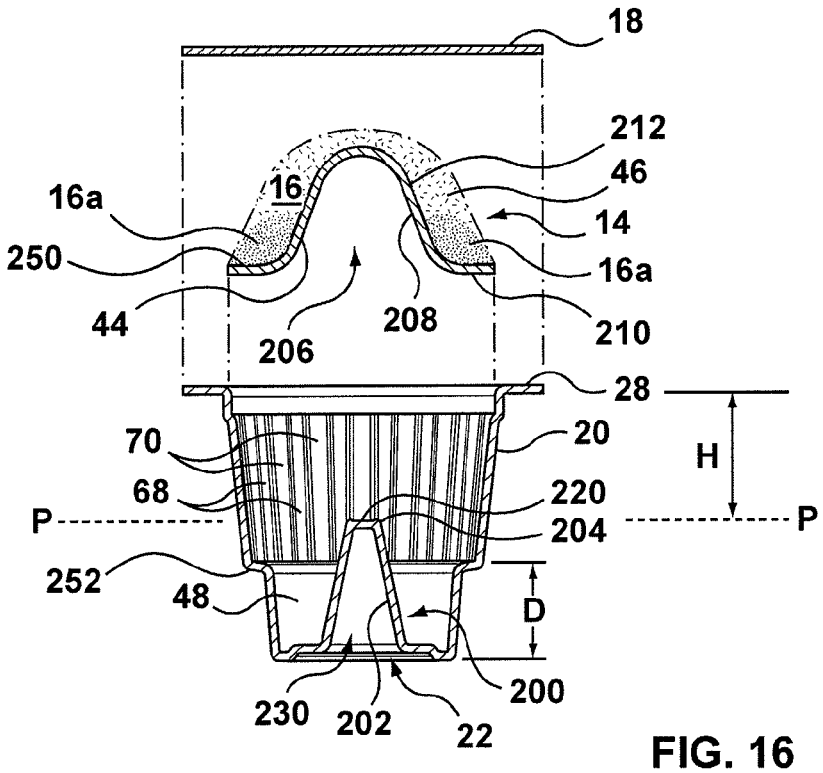
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FIG. 16

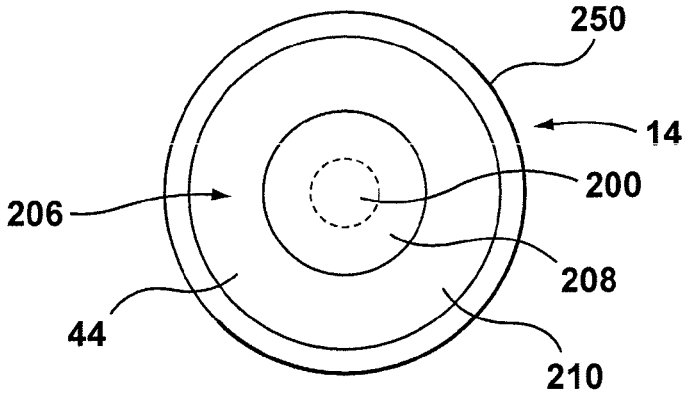

FIG. 17

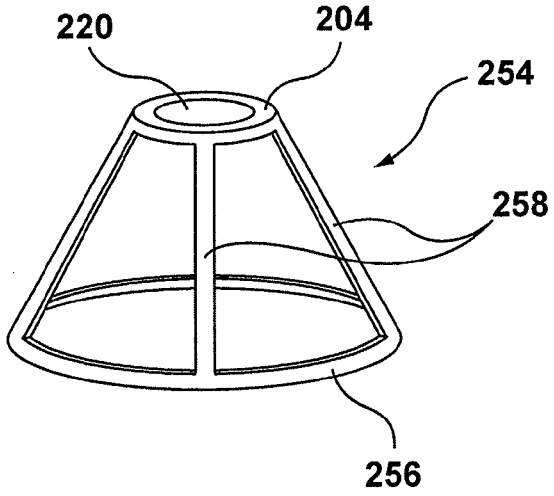

FIG. 18

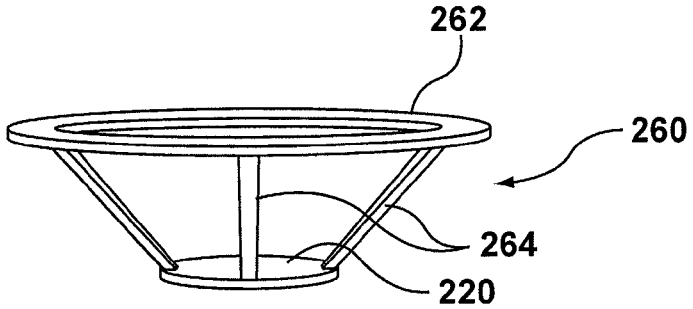

FIG. 19

BEVERAGE CAPSULE

FIELD

This specification relates to beverage capsules and in particular to beverage capsules adapted for use with beverage preparing machines.

BACKGROUND

The following background discussion is not an admission that anything discussed below is citable as prior art or common general knowledge. The documents listed below are incorporated herein in their entirety by this reference to them.

Beverage capsules containing filters and ingredients for use with beverage preparing machines are well known. A fluid, such as hot water, is injected into the beverage capsule using the beverage preparing machine in order that the fluid may mix with the ingredients to form a desired beverage. The desired beverage then flows through the filter and exits the capsule through an opening that is formed in the capsule downstream of the filter.

One problem with such capsules is that the flow of fluid through the filter may be slowed or impeded by fines that collect in the filter. The fines comprise small particles of ingredients that may block some or all of the pores or openings of the filter.

Another problem with such capsules is that the flow of fluid injected into the capsule may be concentrated along a particular path (such as the central axis of the capsule where the fluid is injected) with the result that the fluid does not sufficiently saturate all of the ingredients contained within the capsule.

There is a need for an improved beverage capsule that addresses the above problems or that otherwise provides advantages over conventional capsules.

SUMMARY

In one aspect the invention provides a beverage capsule intended for use in a beverage preparing machine, said beverage capsule comprising:

a body having a side wall extending from an end wall to an opening to define an interior space, said end wall including an extraction region that is adapted to be pierced to facilitate flow of beverage from said capsule;

a filter disposed in said body to define an ingredients chamber, located between said opening and said filter, and an extraction chamber located between said filter and said end wall;

a boss extending from said end wall into said interior space, said boss defining an engagement surface having a plurality of arms for engaging a bottom surface of said filter during use;

one or more ingredients disposed in said ingredients chamber for preparing a desired beverage; and

a cover for covering said opening.

In another aspect the invention provides a beverage capsule intended for use in a beverage preparing machine, said beverage capsule comprising:

a body having a sidewall extending from an end wall to an opening; and

a filter disposed in said body, said filter having an inner portion and an outer portion where the inner portion is spaced a greater distance from said end wall than the distance said outer portion is spaced from said end wall.

In another aspect the invention provides a beverage capsule intended for use in a beverage preparing machine, said beverage capsule comprising:

a body having a side wall extending from an end wall to an opening;

a diffusing surface disposed in said body downstream of where a fluid is intended to enter the opening of said capsule during use with a beverage preparing machine, said diffusing surface being adapted to redirect fluid that engages said diffusing surface to desired locations within said capsule.

In another aspect the invention provides a beverage capsule intended for use in a beverage preparing machine, said beverage capsule comprising:

a body having a side wall extending from an end wall to an opening to define an interior space, said end wall including an extraction region that is adapted to be pierced to facilitate flow of beverage from said capsule;

a filter disposed in said body to define an ingredients chamber, located between said opening and said filter, and an extraction chamber located between said filter and said end wall;

a boss extending from said end wall into said interior space, said boss engaging said filter to define a tented filter zone wherein an inner portion of said filter is spaced a further distance from said end wall than an outer portion of said filter;

one or more ingredients disposed in said ingredients chamber for preparing a desired beverage; and

a cover for covering said opening.

Other aspects and features of the teachings disclosed herein will become apparent, to those ordinarily skilled in the art, upon review of the following description of the specific examples of the specification.

DRAWINGS

The drawings included herewith are for illustrating various examples of articles, methods, and apparatuses of the present specification and are not intended to limit the scope of what is taught in any way. For simplicity and clarity of illustration, where considered appropriate, reference numerals may be repeated among the drawings to indicate corresponding or analogous elements.

FIG. **1** is front view of a beverage capsule in accordance with the present invention;

FIG. **2** is a top view of a body of a beverage capsule in accordance with the present invention;

FIG. **3** is a sectional view of the body shown in FIG. **2** as viewed along lines **3-3**;

FIG. **4** is an enlarged perspective view of the boss for the body shown in FIG. **2**;

FIG. **5** is a top view of the filter bottom for the beverage capsule of FIG. **1** showing the distribution of fines following use;

FIG. **6** is a sectional view of the filter bottom of FIG. **5** as viewed along lines **6-6**;

FIG. **7** is an exploded sectional view of a beverage capsule in accordance with one embodiment of the present invention;

FIG. **8** is an exploded sectional view of a beverage capsule in accordance with another embodiment of the present invention;

FIG. **9** is an exploded sectional view of a beverage capsule in accordance with another embodiment of the present invention;

FIG. **10** is a top view of a filter support disc for a beverage capsule in accordance with another embodiment of the present invention;

FIG. **11** is a side view of the filter support disc shown in FIG. **10**;

FIG. **12** is front view of another embodiment of beverage capsule in accordance with the present invention;

FIG. **13** is a top view of a body of another embodiment of beverage capsule in accordance with the present invention;

FIG. **14** is a sectional view of the body shown in FIG. **13** as viewed along lines **14-14**;

FIG. **15** is an exploded sectional view of a beverage capsule in accordance with another embodiment of the present invention;

FIG. **16** is an exploded sectional view of a beverage capsule in accordance with another embodiment of the present invention;

FIG. **17** is a top view of the filter as formed for the beverage capsule shown in FIG. **16** showing the inner portion and outer portion of filter;

FIG. **18** is a perspective view of a boss element adapted to rest on the end wall of a beverage capsule in accordance with another embodiment of the present invention;

FIG. **19** is a perspective view of a diffusing element adapted to rest on the flange of a beverage capsule in accordance with another embodiment of the present invention.

DESCRIPTION OF VARIOUS EMBODIMENTS

Various apparatuses or methods will be described below to provide examples of the claimed invention. The claimed invention is not limited to apparatuses or methods having all of the features of any one apparatus or method described below or to features common to multiple or all of the apparatuses described below. The claimed invention may reside in a combination or sub-combination of the apparatus elements or method steps described below. It is possible that an apparatus or method described below is not an example of the claimed invention. The applicant(s), inventor(s) and/or owner(s) reserve all rights in any invention disclosed in an apparatus or method described below that is not claimed in this document and do not abandon, disclaim or dedicate to the public any such invention by its disclosure in this document.

A beverage capsule in accordance with the present invention is shown generally at **10** in the FIGS. Beverage capsule **10** includes a body **12**, filter **14**, ingredients **16** and cover **18**.

Body **12** includes a side wall **20** and an end wall **22** together defining an interior space **24**. An opening **26** is defined at one end of body **12**. A flange **28** extends around the perimeter of opening **26** and a stacking ring **30** (if required) is defined in side wall **20** below flange **28**.

End wall **22** includes an extraction region **32** adapted for being pierced by an extraction needle **34** of a beverage preparing machine **36**. Extraction needle **34** is adapted to extend a maximum distance d into body **12** from end wall **22**.

As shown in FIGS. **7-9**, filter **14** is adapted to be disposed within body **12** to define at least one ingredients chamber **46** in an upper region of said interior space for receiving one or more ingredients and at least one extraction chamber **48** in a lower region of said interior space for receiving beverage from said at least one ingredients chamber **46** prior to extraction using said extraction needle **34**. Filter **14** includes a bottom portion **44** that is preferably disposed a distance D from end wall **22** that is sufficient to prevent filter **14** from being pierced or torn by extraction needle **34** during use.

Ingredients **16** may be coffee grounds, tea leaves, chocolate powder, milk powder, instant coffee or any other ingredients or combinations of ingredients that may be used to prepare a beverage in a beverage preparing machine **36** as described herein. Ingredients **16** have a desired particle size range however it is common for fines **16***a* (particles much smaller than the desired range), to be present in ingredients **16**. In conventional capsules, fines **16***a* tend to collect at the lowest most regions of the filter **14** and may block the pores of the filter **14** to such an extent as to slow down or stop the flow of beverage through the filter **14**.

Filter **14** may be formed of any food grade filter material suitable for filtering the ingredients under the conditions of use for the beverage preparing machine. Paper or synthetic filter materials (polymers or biopolymers) are preferred with non-woven filter materials being most preferred.

Body **12** includes a boss **50** that extends into interior space **24** from end wall **22** inwardly of extraction region **32**. Boss **50** is preferably integrally formed with end wall **22** but may alternatively be formed as a separate piece that is supported within body **12** as shown in FIGS. **10** and **11**.

Referring to FIG. **4**, boss **50** includes a side wall **52** that slopes upwardly and inwardly from end wall **22** to an engagement surface **54**. Engagement surface **54** is adapted to engage bottom portion **44** of filter **14** when filter **14** becomes saturated during use of beverage capsule **10**. Preferably, engagement surface **54** is disposed at the same distance from end wall **22** as the bottom portion of filter **14** plus or minus a few millimeters.

Preferably engagement surface **54** is relatively flat and extends generally parallel to end wall **22**. However, engagement surface **54** may instead be dimpled, scored or otherwise profiled. Also, engagement surface **54** may extend at an incline or a curve relative to end wall **22**.

Engagement surface **54** includes a plurality of arms **56** that define voids **58** between respective arms **56**. Boss **50** preferably is a frustum that is star shaped in cross section or top view as shown in FIG. **2**. Other cross sectional shapes may also be suitable including cross shapes or triangular shapes provided that at least one void **58** is defined between arms **56**.

Referring to FIGS. **5** and **6**, when filter **14** and ingredients **16** become saturated during use of beverage capsule **10** in beverage preparing machine **36**, bottom portion **44** sags onto engagement surface **54** over arms **56** and at least partially into voids **58**. As a result, a series of peaks **60**, valleys **62** and slopes **64** are formed in bottom portion **44**. As fluid is introduced into capsule **10** centrally through cover **18**, fluid tends to form eddies and carry fines **16***a* to the peripheral regions of filter **14**. Fines **16***a* tend to settle and collect within valleys **62** particularly at the periphery of bottom portion **44**. This ensures that the remainder of bottom portion **44** is sufficiently clear of fines **16***a* to allow beverage to flow at a desired rate.

In addition to providing collection zones in valleys **62** for fines **16***a*, it is believed that contact between bottom portion **44** of filter **14** and engagement surface **54** of boss **50** encourages fluid flow through filter **14** in a similar manner as contact between one's finger and the walls of a tent encourages flow of water through the tent wall. It is believed that the plurality of arms **56** and voids **58** aid in increasing the surface tension at bottom portion **44** of filter **14** as filter **14** becomes saturated during use. The increased surface tension further opens the pores of filter **14** to encourage fluid flow particularly at the location of voids **58**.

Boss **50** preferably defines a corresponding recess **66** on outer surface of end wall **22** that may be adapted to fit with a corresponding shaped key **66***a* extending from the beverage preparing machine **36**. The recess **66** aids in aligning capsule **10** in a desired orientation within beverage preparing machine **36** and also provides an opportunity for capsules **12** to be adapted for use only with machines **36** having corresponding keys **66***a*.

Body **12** may also include channels **68** defined in side wall **14** between upper and lower regions of the interior space of capsule **10** to facilitate air and fluid flow between the regions. Channels **68** may be defined between ribs **70** that provide additional rigidity to side wall **14**. The added rigidity of ribs **70** allows capsule **10** to be better suited to withstand forces associated with manufacturing, handling, and brewing. Channels **68** and ribs **70** are optional elements however and side wall **14** of body **12** may have other configurations including the flat sided configuration seen with conventional beverage capsules.

Referring to one embodiment of capsule **10** as shown in FIG. **7**, filter **14** is generally cylindrical in shape with a filter side wall **80** and filter bottom **82**. Filter **14** also includes a gasket **84**, preferably integrally formed with filter **14**, for securing filter **14** to flange **28** of body **12** to support filter **14** within capsule **10**. Gasket **84** may be formed of a material having a higher melt temperature than flange **28** and cover **18** to allow the elements to be heat sealed together. Alternatively, flange **28** may be larger in diameter than gasket **84** (as shown in FIG. **2**) in order to define a first region **86** for securing filter **14** to flange **28** and a second region **88** located radially outwards from first region **86** for securing cover **18** to flange **28**.

Referring to another embodiment of capsule **10** as shown in FIG. **8**, filter **14** has a peripheral edge **88** (instead of gasket **84**) that is secured to an attachment surface **90** defined on side wall **14** at an upper inside portion of body **12** such as at stacking ring **30**.

Referring to another embodiment of capsule **10** as shown in FIG. **9**, filter **14** is generally disc shaped and has a peripheral edge **92** secured to a ledge **94** defined on side wall **14** of body **12**.

Referring to FIGS. **10** and **11**, a filter support disc **96** is shown. Filter support disc **96** is adapted to be supported on ledge **94** of body for supporting a filter **14**. Filter support disc **96** includes a ring **98** that is sized to be secured to ledge **94**. Spokes **100** extend inwardly from ring **98** to support engagement surface **54**. Engagement surface **54** acts in a similar manner as described above to engage a bottom portion of filter **14** to encourage flow of fluid there through. Spokes **100** may extend at an incline (as shown in FIG. **11**) if necessary to support engagement surface **54** at a desired level so as to engage bottom portion **44** of filter **14** once it becomes saturated. Preferably, engagement surface **54** is disposed at the same distance from end wall **22** as the bottom portion of filter **14** plus or minus a few millimeters

Referring to FIGS. **12** to **19**, other embodiments of beverage capsule are shown. The same reference numerals are used to refer to similar elements as described above.

Body **12** includes a boss **200** that extends into interior space **24** from end wall **22** inwardly of extraction region **32**. Boss **200** is preferably integrally formed with end wall **22** but may alternatively be formed as a separate element that is supported within body **12** as shown in FIG. **18**. Boss **200** preferably is shaped as a frustum and most preferably is frustoconical or polygonal.

Referring to FIGS. **15** and **16**, boss **200** includes a side wall **202** that slopes upwardly and inwardly from end wall **22** to a tip **204**. Boss **200** is adapted to support a portion of filter **14** to define a tented filter zone **206** within interior space **24**. Tented filter zone **206** includes a raised inner portion **208** of filter **14** that is spaced a greater distance from end wall **22** than a lower outer portion **210** of filter **14**.

As fluid is introduced into capsule **10** centrally through cover **18**, fluid tends to form eddies and carry fines **16***a* to the peripheral regions of bottom portion of filter **14**. Fines **16***a* tend to settle and collect at the lower outer portion **210** of filter **14**. Tented filter zone **206** includes an inclined filter wall **212** that ensures that the remainder of bottom portion **44** is sufficiently clear of fines **16***a* to allow beverage to flow at a desired rate.

Tip **204** preferably defines a diffusing surface **220** to engage and diffuse a laminar stream of fluid that enters capsule **10** for optimum saturation of ingredients within capsule **10**. Diffusing surface **220** may be integrally formed with tip **204** or it may be disposed as a separate element within capsule **10** as shown in FIG. **19**. Diffusing surface **220** preferably is concave in shape but other suitable diffusing structures may be utilized.

For beverage preparing machines having a central nozzle that directs fluid in a laminar stream into the capsule **10**, diffusing surface **220** is preferably sized to engage the entire stream of fluid without occupying more space than is necessary within capsule **10**. Preferably, diffusing surface **220** has a cross-sectional area that is no greater than 20% of the cross-sectional area of interior space of capsule **10** as measured in a plane P in which diffusing surface **220** is located. It is also preferable that diffusing surface **220** is disposed at a height within capsule **10** that optimizes the saturation of ingredients within the capsule without occupying more space than is necessary within capsule. Preferably, diffusing surface **220** is spaced a distance H from opening that is no less than 20% and no more than 80% of the overall height of capsule **10** as measured from end wall **22** to opening **24**.

Boss **200** preferably defines a recess **230** on an outer surface of end wall **22** that may be adapted to fit with a corresponding shaped key **232** extending from the beverage preparing machine **36**. The recess **230** aids in aligning capsule **10** in a desired orientation within beverage preparing machine **36** and also provides an opportunity for capsules **12** to be adapted for use only with machines **36** having corresponding keys **232**.

Referring to one embodiment of capsule **10** as shown in FIG. **15**, filter **14** includes a filter side wall **240** and filter bottom **242** having tented filter zone **206** defined therein. Filter **14** also includes a gasket **244** for securing filter **14** to flange **28** of body **12** to support filter **14** within capsule **10**. Gasket **244** may be formed of a material having a higher melt temperature than flange **28** and cover **18** to allow the elements to be heat sealed together. Alternatively, flange **28** may be larger in diameter than gasket **244** (as shown in FIG. **13**) in order to define a first region **246** for securing filter **14** to flange **28** and a second region **248** located radially outwards from first region **246** for securing cover **18** to flange **28**.

Referring to another embodiment of capsule **10** as shown in FIG. **16**, filter **14** has a peripheral edge **250** secured to a ledge **252** defined on side wall **20** of body **12** with tented filter zone **206** defined in filter **14** inwardly of peripheral edge **250**.

Referring to FIG. **17**, a top view of the filter **14** for the embodiment of capsule **10** in FIG. **16** is shown. The figure shows the location where boss **200** engages bottom portion

44 of filter 14 to form tented filter zone 206 with raised inner portion 208 and lower outer portion 210.

Referring to FIG. 18, a boss element 254 adapted for resting on end wall 22 is shown. Boss element 254 includes an annular footing 256, side ribs 258 and tip 204 defining diffusing surface 220. Boss element 254 is adapted for use in a standard cup-shaped body 12 instead of integrally molding a boss into end wall 22. Diffusing surface 220 preferably is concave in shape but other suitable diffusing structures may be utilized.

Referring to FIG. 19, a diffusing element 260 adapted for resting on flange 28 of capsule 10 is shown. Diffusing element 260 includes an annular flange 262, side ribs 264 and diffusing surface 220. Diffusing element 260 is adapted for use in a body 12 of a capsule 10, such as a conventional beverage capsule, where diffusion of fluid to better saturate ingredients is desired and no boss 200 or boss element 254 is provided. Diffusing surface 220 preferably is concave in shape but other suitable diffusing structures may be utilized.

While the above description provides examples of one or more processes or apparatuses, it will be appreciated that other processes or apparatuses may be within the scope of the accompanying claims.

We claim:

1. A beverage capsule intended for use in a beverage preparing machine, said beverage capsule comprising:

a body having a side wall extending from an end wall to an opening to define an interior space, said end wall including an extraction region that is constructed and arranged to be pierced to facilitate flow of beverage from said capsule;

a filter disposed in said body to define an ingredients chamber, located between said opening and said filter, and an extraction chamber located between said filter and said end wall;

a boss extending from said end wall into said interior space, said boss engaging said filter to define a tented filter zone wherein an inner portion of said filter is spaced a further distance from said end wall than an outer portion of said filter;

one or more ingredients disposed in said ingredients chamber for preparing a desired beverage;

a cover for covering said opening; and

a diffusing surface disposed in said body beneath a surface of said ingredients, said diffusing surface being constructed and arranged to engage and diffuse a laminar stream of fluid that enters the capsule during use in a beverage preparing machine.

2. The beverage capsule of claim 1, wherein said diffusing surface is constructed and arranged to redirect fluid that engages said diffusing surface to desired locations within said capsule.

3. The beverage capsule of claim 1, wherein said diffusing surface is concave in shape.

4. The beverage capsule of claim 1, wherein said diffusing surface is defined on the portion of said boss that engages said filter.

5. The beverage capsule of claim 1, wherein said boss defines an engagement surface having a plurality of arms for engaging a bottom surface of said filter during use.

6. The beverage capsule of claim 5, wherein said engagement surface is star shaped.

7. The beverage capsule of claim 1, wherein said boss includes a plurality of channels extending at least partially between an engagement surface, where said boss engages said filter, and said end wall.

8. The beverage capsule of claim 1, wherein said boss is integrally formed with said end wall.

9. The beverage capsule of claim 1, further comprising at least one capsule key disposed on an exterior surface of said body for fitting to a corresponding at least one machine key element disposed on an interior surface of a capsule receiving chamber of a beverage preparing device for positioning the capsule in a desired orientation within said receiving chamber.

10. The beverage capsule of claim 1, wherein said diffusing surface is disposed at no less than 20% and no more than 80% of the height of the capsule as measured from said end wall to said opening.

11. A beverage capsule intended for use in a beverage preparing machine, said beverage capsule comprising:

a body having a side wall extending from an end wall to an opening to define an interior space;

a filter disposed in said body to define an ingredients chamber;

one or more ingredients disposed in said ingredients chamber for preparing a desired beverage;

a cover for covering said opening; and

a diffusing surface disposed beneath a surface of said ingredients, said diffusing surface being constructed and arranged to engage and diffuse a laminar stream of fluid that enters the capsule during use in a beverage preparing machine.

12. The beverage capsule of claim 11, wherein said diffusing surface is constructed and arranged to redirect fluid that engages said diffusing surface to desired locations within said capsule.

13. The beverage capsule of claim 11, wherein said diffusing surface is concave in shape.

14. The beverage capsule of claim 11, wherein said diffusing surface is defined on the portion of said boss that engages said filter.

15. The beverage capsule of claim 11, wherein said diffusing surface is disposed at no less than 20% and no more than 80% of the height of the capsule as measured from said end wall to said opening.

* * * * *